Patent Caims

1. Device for actuating double seat valves, especially for the food and beverage industry,
   - with two closing elements (3, 4) movable independently of one another
   - which enclose between them a leakage chamber(5) ,
   - which is connected over at least one path of travel with the environment of the double seat valve,
   - with the independently actuated, first closing element (3) designed as a sliding piston,
   - that after a partial stroke comes to rest on the dependently actuated second closing element (4), designed as a seat disc, and likewise transfers this with its further opening movement into a full open position (H),
   - with valve stems (3a, 203, 103 ; 4a, 204) which fit into one another in a telescoping manner and that extend outward on the side of the second closing element (4) from a valve housing (1),
   - over which the closing elements (3, 4), additionally to the fully open position (H) and independent of each other, each are able to be brought in a partially open position (T1, T2)
   - whereby the fully open position (H) is generated through a main adjustment device (100) and in the opposite direction partially open positions (T1, T2) through the respective closing elements (3, 4) assigned individual adjustment devices (200; 200.1, 200.2)
   - and the adjustment of the closing elements (3, 4) is done by actuating pistons (104, 205, 206 or 206/206.1) loaded by pressurizing medium acting on the control rods (3a, 203; 4a, 204),

   characterized in that

   - the individual adjustment devices (200; 200.1, 200.2) are designed independently and are additively inserted between the main adjustment device (100) and the valve housing (1),
   - that the third working piston (206; 206/206.1) is positioned axially moveable on the second control rods (4a, 204), which are designed as hollow

rods, surrounding the first control rods (3a, 203) and is able to be brought with this in the direction of the second partially open position (T2) in a clamping connection,

- that the second actuating piston (205) is permanently connected on the one side with the first control rod (3a, 203) which adjusts the first closing element (3),
- that it is alternatively directly or indirectly axially movable positioned on a first actuator stem (103) of the main adjustment device (100) and is able to be brought with this in the direction of the fully open position (H) in a clamping connection,
- and that it is able to be loaded with pressurizing medium on each of its two piston surfaces.

2. Device according to Claim 1, **characterized**,
   - in that the individual adjustment devices (200; 200.1, 200.2) are arranged in a single housing (201/202) designed from two housing members (201, 202) and there with their actuating pistons (205, 206 or 206/206.1) form three pressurizing medium chambers (200a, 200b, 200c or 200c/200c*) able to be controlled independently of each other,
   - and that the second pressurizing medium chamber (200a) is formed between the second actuating piston (205) and the third housing member (201), the third pressurizing medium chamber (200b) is formed between the third actuating piston (206) and the fourth housing member (202) and the fourth pressurizing medium chamber (200c or 200c/200c*) is formed between the two actuating pistons (205, 206).

3. Device according to Claims 1 or 2, **characterized in** that the first actuator stem (103, 103a) of the main adjustment device (100) extends out from the latter in the direction of the individual adjustment device (200; 200.1, 200.2) and there is guided moveable axially into the front end of the second actuator stem (203, 203a or 203a*), which is permanently connected with the first control rod (3a), up to a stop face (203d).

4. Device according to one of the Claims 1 to 3, **characterized in** that the third actuating piston (206) on its side facing the second actuating piston (205) is connected tightly with a smaller diameter additional piston (206.1), but is however able to be loosened, that the additional piston (206.1) working together with a housing ring (213.1) fixed on the housing (201/202) of the individual adjustment device (200) forms a fifth pressurizing medium chamber (200d), which is connected with a third pressurizing medium chamber (200b) formed between the third actuating piston (206) and the fourth housing member (202), and that with the introduction of a third pressurizing medium flow (D3) to the third pressurizing medium chamber (200b) also an additional force affecting the additional piston (206.1) results additionally in the fifth pressurizing medium chamber (200d), which additively superimposes on the force affecting the third actuating piston (206).

5. Device according to Claim 4, **characterized in that** the additional piston (206.1) has a larger diameter exterior piston section (206.1a) and a smaller diameter interior piston section (206.1b), that the interior piston section (206.1b) is sealed on its frontal end from the third actuating piston (206) and is screwed with this, that the exterior piston section (206.1a) is sealed on its circumference from the shell of a cylindrical cutout (213.1a) in the housing ring (213.1) and the interior piston section (206.1b) is sealed on its circumference in a coaxial through bore (213.1b) in the housing ring (213.1), and that in the connection area of the third actuating piston (206) with the additional piston (206.1) are arranged in the former a first pressurizing medium channel (206b) and in the latter a second pressurizing medium channel (206.1d), which correspond with one another and connect the third pressurizing medium chamber (200b) and the fifth pressurizing medium chamber (200d) with one another permeable to the pressurizing medium.

6. Device according to Claim 4 or 5, **characterized in that** the housing ring (213.1) has a radial projection (213.1c) on its circumference, with which the

housing ring (213.1) is fixed interlocking in the connection area between the third and the fourth housing member (201, 202).

7. Device according to one of the Claims 4 to 6, **characterized in that** a fourth pressurizing medium connection (210) for an alternate first pressurizing medium flow (D1*) for loading of the second actuating piston (205) located in the third housing member (201) discharges in a preceding pressurizing medium chamber (200c*) in the area between the third actuating piston (206) and the housing ring (213.1), and that the preceding fourth pressurizing medium chamber (200c*) is connected with a fourth pressurizing medium chamber (200c) formed between the second actuating piston (205) on one side and the housing ring (213.1) in connection with the additional piston (206.1) on the other side through at least one connection channel (213.1d), which is located in a part of the housing ring (213.1) containing the cylindrical cutout (213.1a) on the exterior.

8. Device according to one of the Claims 1 to 7, **characterized in that** the end-of-travel limit of the second actuating piston (205) for the first partially open position (T1) and that of the third actuating piston (206; 206/206.1) for the second partially open position (T2) is done by a stop ring (213) or housing ring (213.1), axially moveable on both sides, permanently located on the housing (201/202) between the actuating pistons (205, 206).

9. Device according to one of the Claims 2 to 8, **characterized in that** the fourth pressurizing medium chamber (200c) is connected according to the stream with a first pressurizing medium connection (7b), which is provided with a control device (7) located in the connection to the main adjustment device (100).

10. Device according to one of the Claims 2 to 3 or 8, **characterized in that** the fourth pressurizing medium chamber (200c) is connected in the direction of the stream to a fourth pressurizing medium connection (210), which is proved on the housing (201/202) of the individual adjustment device (200).

11. Device according to Claim 9 or 10, **characterized in that** the respective pressurizing medium connection (7b; 210) is also additionally connected in the direction of the stream with a first pressurizing medium chamber (100a) of the main adjustment device (100).

12. Device according to one of the Claims 1 to 11, **characterized in that** the first actuator stem (103) is arranged able to rotate against the second actuating piston (205) or with the second actuator stem (203, 203a or 203a*) connected with this.

13. Device according to Claim 12, **characterized in that** the frontal end of the first actuator stem (103) supports a header (103a), which engages in a cutout (203b) inside a headpiece (203a or 203a*) formed on a second actuator stem (203) and a diameter enlarged in comparison to it.

14. Device according to Claim 13, **characterized in that** a plain bearing bush (212) is located between the header (103a) and the cutout (203b).

15. Device according to one of the Claims 1 to 14, **characterized in that** the first control rod (3a) is screwed with the second actuator stem (203) in the area of the second individual adjustment device (200.2), that a position indicator rod (7a) is provided which each time concentrically penetrates the first actuator stem (103, 103a) completely and the second actuator stem (203, 203a or 203a*) up to the first control rod (3a), which ends on one side in a control device (7) and on the other side is screwed into the second actuator stem (203) with its frontal end and thereby counter secures the screw connection with its assigned second end surface (7c) between the control rod and the actuator rod (3a, 203) of the first end surface (3b).

16. Device according to Claim 15, **characterized in that** the position indicator rod (7a) forms a continuous ring channel (106) with the first actuator stem (103), the header (103a), the headpiece (203a; 203a*) and the second actuator stem (203), each of which it surrounds in the named sequence, which branches over the first cross hole (106a) in the first pressurizing medium chamber (100a) of the main adjustment device (100) and over the second cross hole (203c) in the fourth pressurizing medium chamber (200c) of the individual adjustment device (200).

17. Device according to one of the Claims 1 to 16, **characterized in that** the housing member (101, 102) of the main adjustment device (100) and each (201, 202) of the individual adjustment devices (200) are made from housing rough parts of the same shape.

18. Device according to one of the Claims 1 to 17, **characterized in that** the housing member (101, 102) of the main adjustment device (100) and each (201, 202) of the individual adjustment devices (200) are each integrally joined together.

19. Device according to one of the Claims 1 to 18, **characterized in that** the actuating pistons (104, 205, 206, 206/206.1) are made of corrosion resistant light alloy metal.